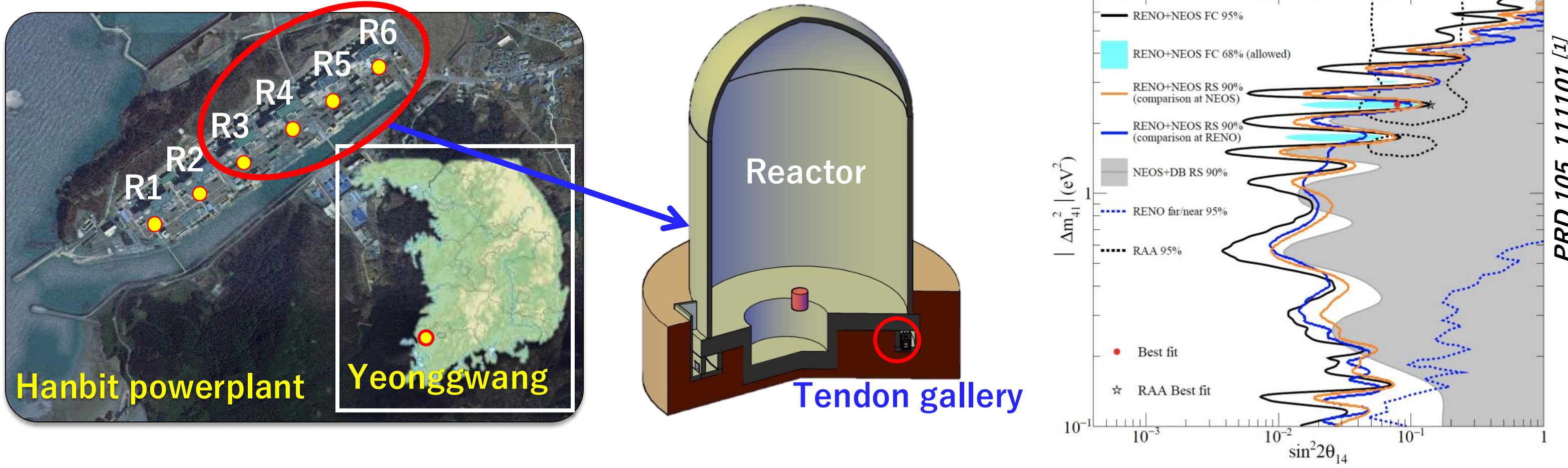
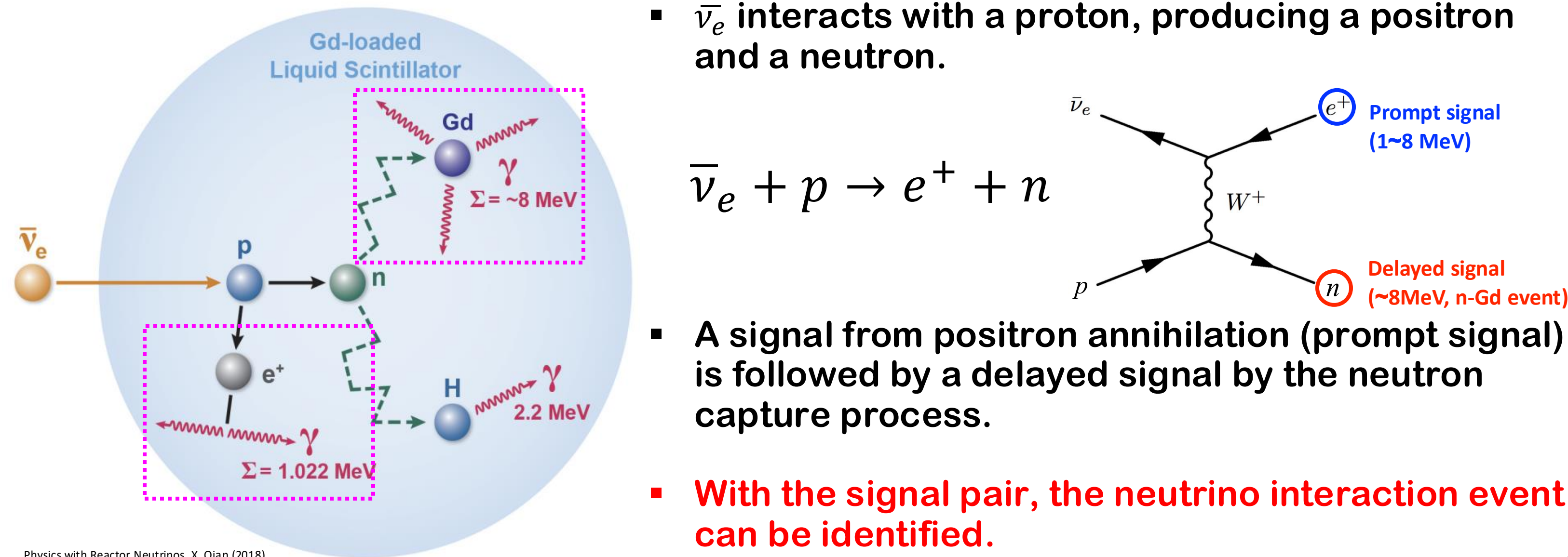


Motivation

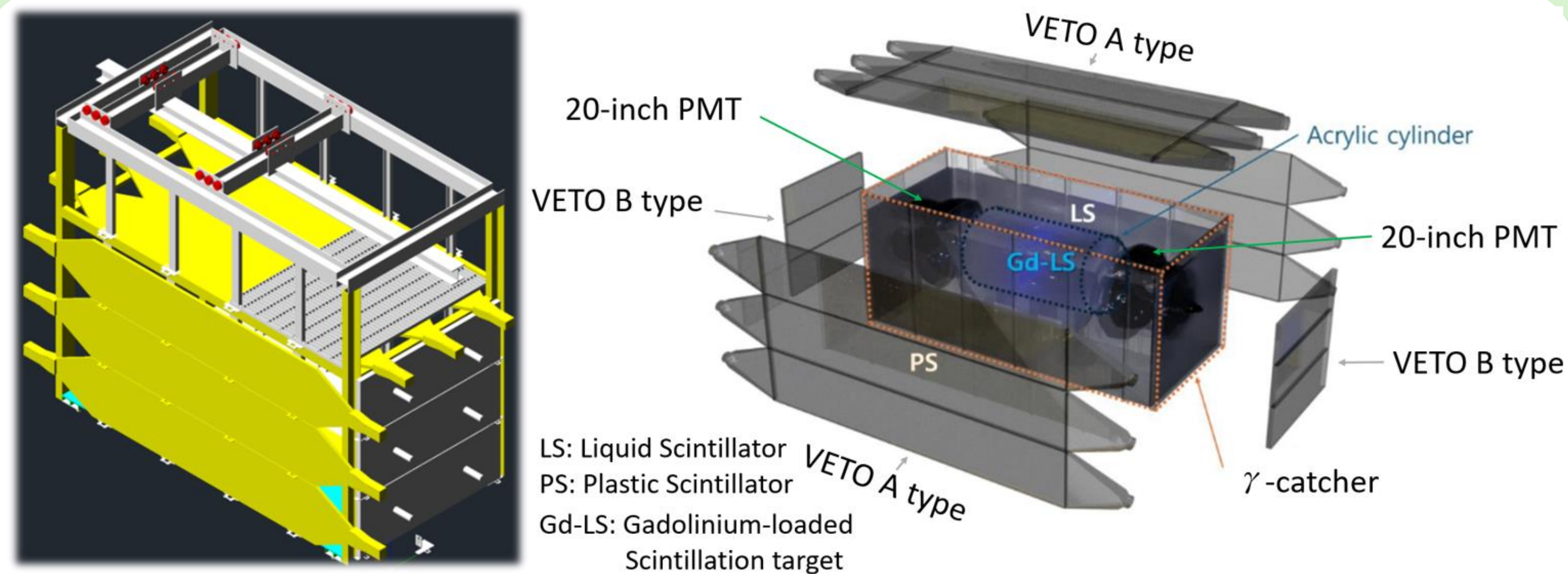


- The RENE(Reactor Experiment for Neutrinos and Exotic) experiment uses the IBD signal from reactor to search for sterile neutrinos.
- RENO-NEOS joint analysis hints the sterile neutrino at $\Delta m_{41}^2 \sim 2 \text{ eV}^2$.
- To confirm θ_{14} , γ -catcher was designed to reduce systematic uncertainties.
- The RENE detector
 - Target : Gadolinium(Gd)-loaded($\sim 0.5 \%$) liquid scintillator(LS).
 - γ -catcher : LS detector, to catch escaping γ s from the target.
 - Installation : In the tendon gallery of Hanbit Nuclear Power Plant.
 - Veto detector : Plastic scintillator, to remove external background.

Detector Method : Inverse Beta Decay(IBD)

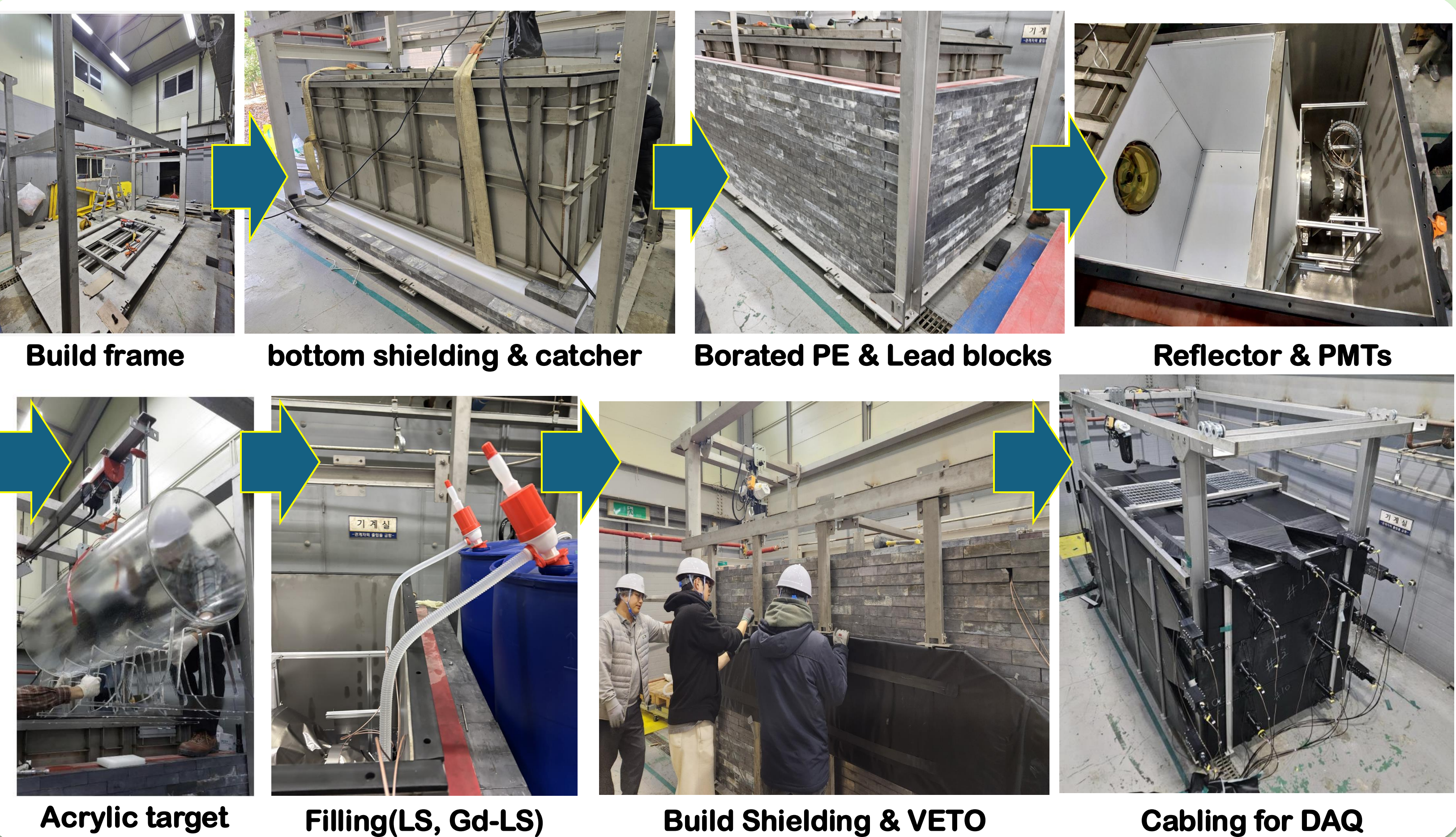


Detector Structure

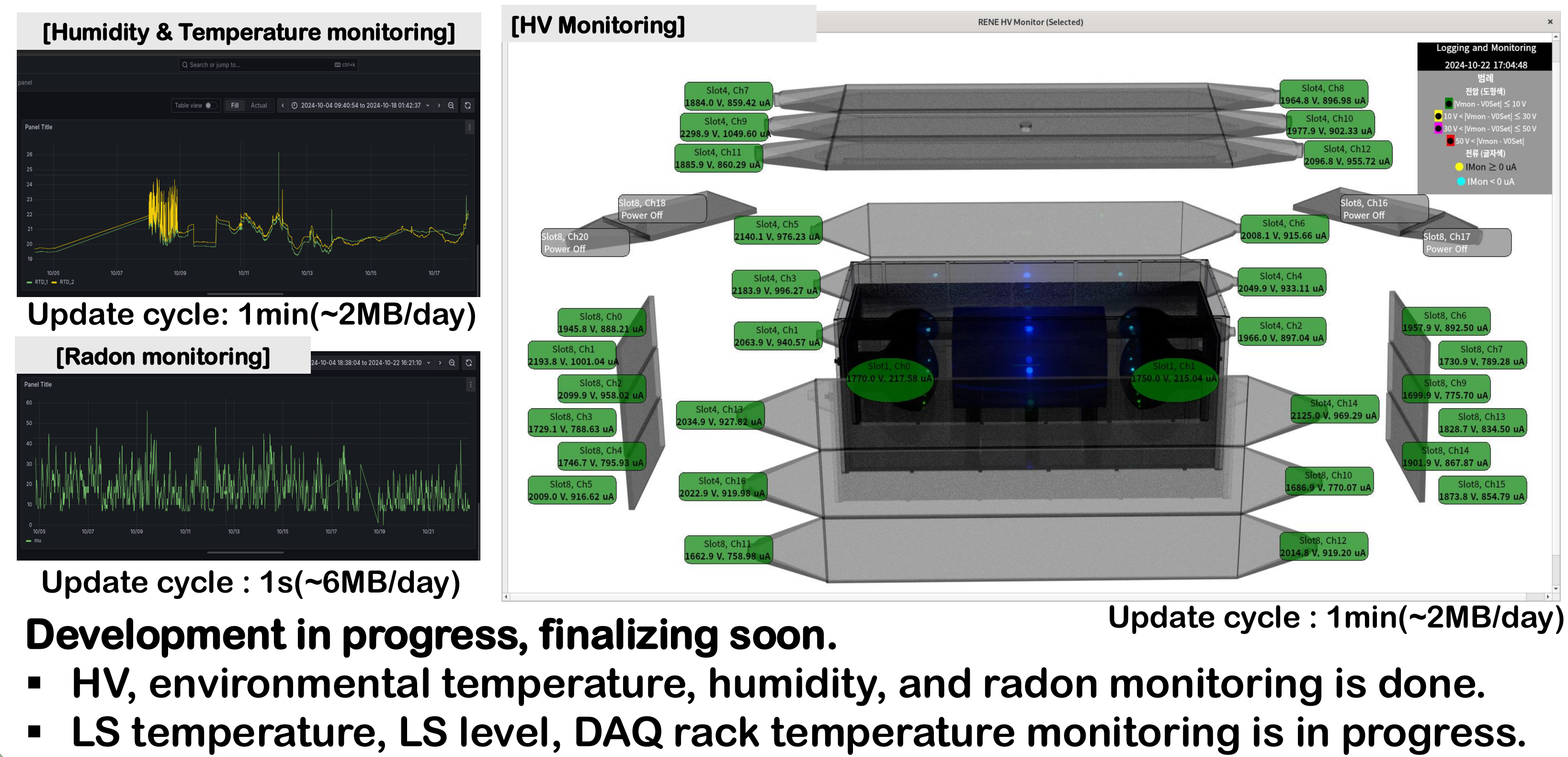


- Target** : Gd-LS in acrylic cylinder of $R=275 \text{ mm}$ and $L=1200 \text{ mm}$.
- Gamma Catcher** : LS in stainless steel of $2800 \times 1200 \times 1200 \text{ mm}$.
- Shielding** : 100 mm borated(5%) PE, 100 mm high density PE, and 100 mm lead blocks.
- Veto detector** : Plastic scintillators(EJ-200), instrumented with 32 2-inch PMTs.

Detector Construction



Slow Control Monitoring(SCM)

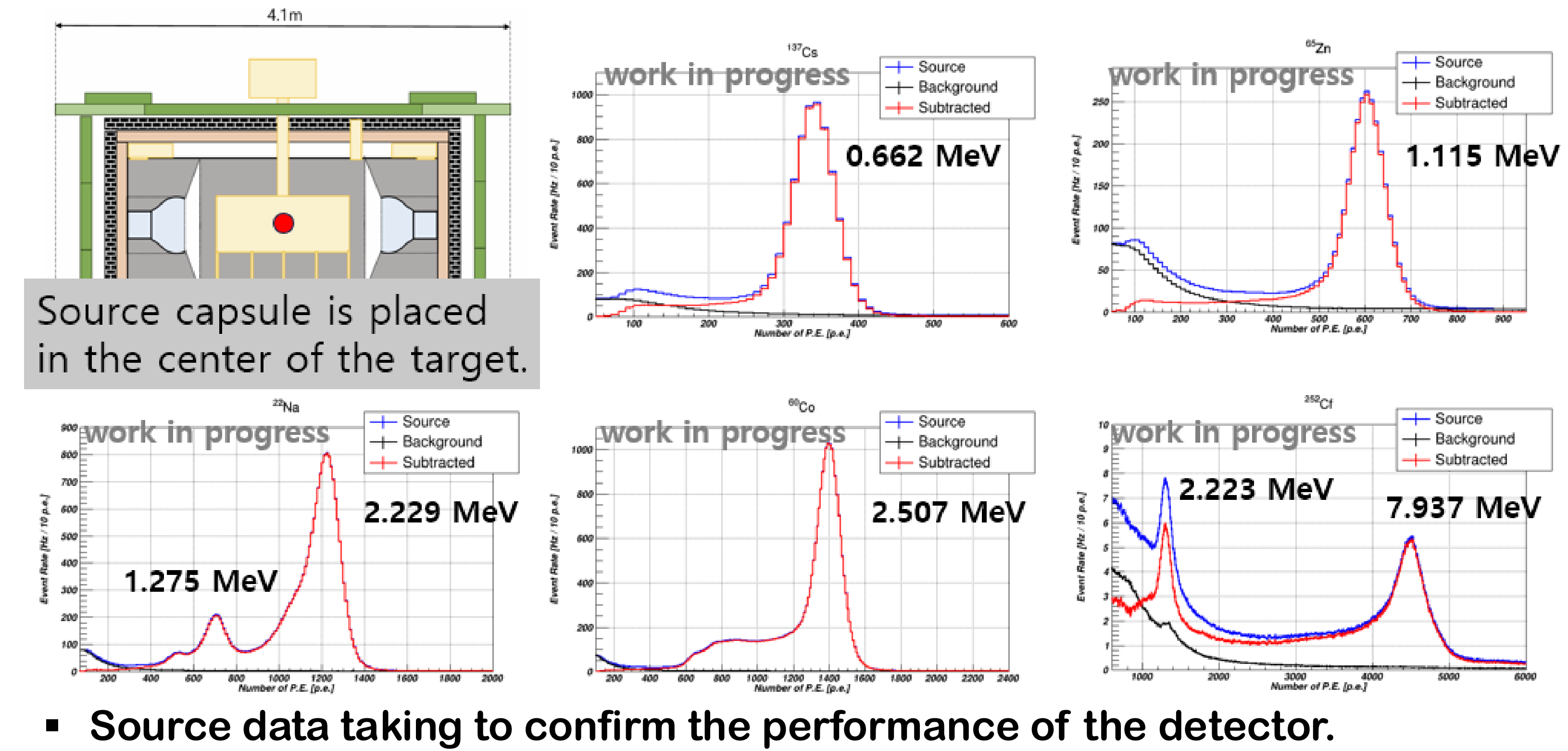


Development in progress, finalizing soon.

- HV, environmental temperature, humidity, and radon monitoring is done.
- LS temperature, LS level, DAQ rack temperature monitoring is in progress.

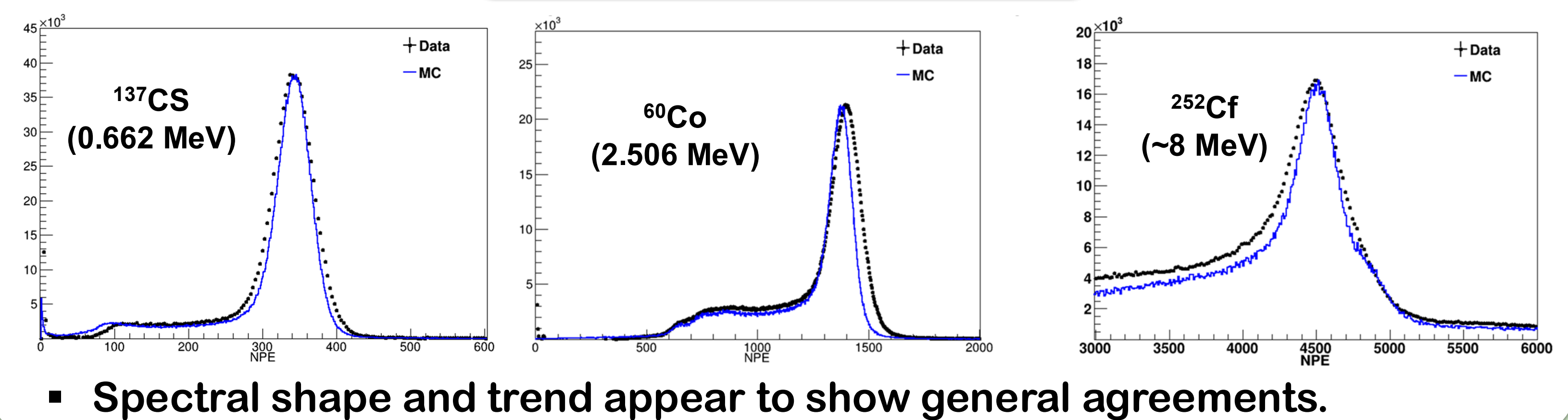
Detector Calibration

Number of photo-electrons(NPE) distribution of radioactive source



- Source data taking to confirm the performance of the detector.

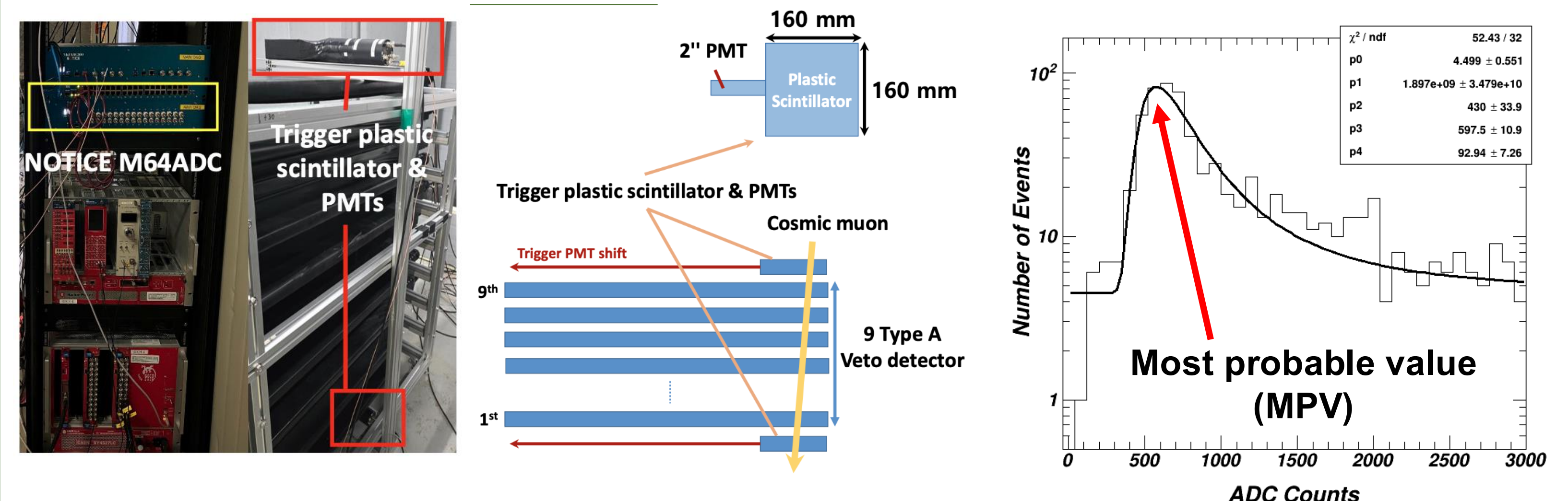
NPE spectra with MC & DATA



- Spectral shape and trend appear to show general agreements.

Veto Detector

Cosmic coincidence test



- The most probable value(MPV) : Fit with exponential & landau function.
- The minimum ionizing value of dE/dx : $\sim 2 \text{ MeV}\cdot\text{cm}^2/\text{g}$.
- HV values were adjusted to fit the Landau peak position and threshold.

Summary

- The RENE experiment aims to search for the sterile neutrino at $\Delta m_{41}^2 \sim 2 \text{ eV}^2$.
- The construction of RENE detector is done.
- RENE detector commissioning is on going.
- We are currently tuning the DAQ condition, calibration, and so on.
- Finally, we plan to install & start data taking in tendon gallery in 2025.

Reference

[1] Z. Atif et al., Phys. Rev. D 105, L111101 (2022)